

Chu Chen, PhD

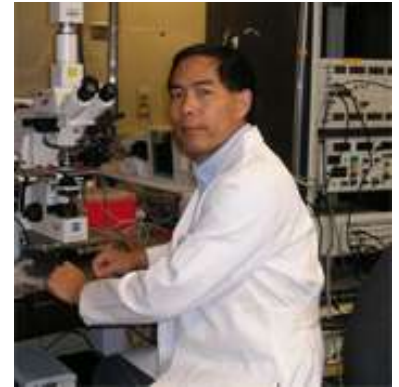
Associate Professor of Otorhinolaryngology and Neuroscience

Education

1994-1996 Postdoctoral fellow, LSU Health Sciences Center, New Orleans
1989-1993 PhD, Tulane University, New Orleans
1983-1986 MS, Zhejiang Medical University, Hangzhou, China
1979-1983 BS, Nanjing University, Nanjing, China

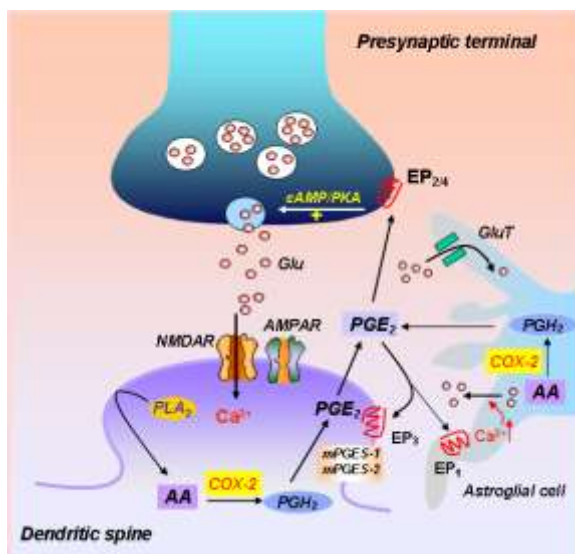
Academic positions

2008-present Associate Professor, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
2002-2008 Assistant Professor, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
1998-2002 Research Assistant Professor, Department of Otorhinolaryngology and Neuroscience Center, LSUHSC
1996-1998 Research Assistant Professor, Department of Otorhinolaryngology, LSUHSC
1988-1989 Lecturer, Department of Physiology, Zhejiang Medical University, Hangzhou, China
1986-1988 Instructor, Department of Physiology, Zhejiang Medical University, Hangzhou, China



Research Interests

My research programs focus on inflammation in physiology and diseases. Specifically, I am interested in lipid signaling in hippocampal synaptic transmission and plasticity. Cyclooxygenase-2 (COX-2), an enzyme that converts arachidonic acid to prostaglandins, is a key player in neuroinflammation, which has been implicated in the pathogenesis of neurodegenerative diseases (e.g., multiple sclerosis, Parkinson's and Alzheimer's diseases) and contributes to traumatic brain injury- and ischemia-induced neuronal damage. However, the mechanism underlying neuroinflammation-induced neurological disorders are largely unknown. To address the fundamental mechanisms of neuroinflammation in hippocampal synaptic function and neurodegeneration, we are employing several approaches, including electrophysiological patch clamp recordings, molecular biology techniques, immunostaining, optical imaging, mass spectrometry and neurotoxicity assays. Currently, we have three ongoing projects in my laboratory: 1) Decipher molecular and cellular mechanisms underlying COX-2-mediated physiological functions and pathogenesis of neurodegenerative diseases (e.g., Alzheimer's disease); 2) Determine the role COX-2 oxidative metabolism of endogenous cannabinoids in hippocampal synaptic plasticity and neurotoxicity; 3) Explore mechanisms of endogenous cannabinoids in synaptic activity and neuroprotection. Recently, we launched a new research project where we investigate the molecular mechanisms responsible for the marijuana-altered synaptic plasticity and cognition as well as tolerance to cannabis. The results generated from these projects will provide mechanistic bases for opening up new therapeutic interventions for treating, ameliorating or preventing neuroinflammation-induced



neuroinflammation-induced

neurodegenerative diseases and cannabis-related disorders.

Cartoon illustrating COX-2 synthesized prostaglandin E₂ (PGE₂) as a retrograde messenger in synaptic signaling.

Current Funding

Source: Alzheimer's Association IIRG-05-13580 (10/01/2005-9/30/2009)

Title: COX-2 regulation of endocannabinoid signaling in neurodegeneration.

Role on Grant: PI.

Source: NIH-NINDS R01NS054886 (6/1/2007-3/31/2011)

Title: Endocannabinoids in COX-2 mediated synaptic modification and neurotoxicity.

Role on Grant: PI.

Source: NIH-NIDA R03DA025971 (9/15/2008-8/31/2010)

Title: Astroglial cells in marijuana-altered synaptic plasticity

Role on Grant: PI.

Recent Publications

Yang H, Zhang J, Breyer RM & **Chen C**. Altered hippocampal long-term synaptic plasticity in mice deficient in the PGE₂ EP₂ receptor. *J Neurochem* 108: 295-304, 2009.

Zhang J & **Chen C**. Endocannabinoid 2-arachidonoylglycerol protects neurons by limiting COX-2 elevation. *J Biol Chem* 283: 22601–22611, 2008.

Yang H & **Chen C**. COX-2 in synaptic signaling. *Curr Pharm Design* 14: 1443-1451, 2008.

Yang H, Zhang J, Andreasson K & **Chen C**. COX-2 Oxidative metabolism of endocannabinoids augments hippocampal synaptic plasticity. *Mol Cell Neurosci* 37: 682-695, 2008.

Sang N, Zhang J & **Chen C**. COX-2 oxidative metabolite of endocannabinoid 2-AG enhances excitatory glutamatergic synaptic transmission and induces neurotoxicity. *J Neurochem* 102: 1966-1977, 2007.

Sang N & **Chen C**. Lipid signaling and synaptic plasticity. *Neuroscientist* 12: 425-434, 2006.

Sang N, Zhang J & **Chen C**. PGE₂ glycerol ester, a COX-2 oxidative metabolite of 2-arachidonoyl glycerol, modulates inhibitory synaptic transmission in mouse hippocampal neurons. *J Physiol (Lond)* 572: 735-745, 2006.

Sang N, Zhang J, Marcheselli V, Bazan, NG & **Chen C**. Postsynaptically synthesized prostaglandin E₂ modulates hippocampal synaptic transmission via a presynaptic PGE₂ EP₂ receptor. *J Neurosci* 25: 9858-9870, 2005.

Chen C. β -Amyloid increases dendritic Ca²⁺ influx by inhibiting the A-type K⁺ current in hippocampal CA1 pyramidal neurons. *Biochem Biophys Res Commun* 338: 1913-1919, 2005.

Gois SD, Schafer MK-H, Defamie N, **Chen C**, Ricci A, Weihe E, Varoqui H & Erickson JD. Homeostatic scaling of vesicular glutamate and GABA transporters expression in rat neocortical circuits. *J Neurosci* 25:7121-7133, 2005.

Chen C & Bazan NG. Lipid signaling: Sleep, synaptic plasticity, and neuroprotection. *Prost Lipid Mediators* 77: 65-76, 2005.

Zhu P, Genc A, Zhang X, Zhang J, Bazan NG & **Chen C**. Heterogeneous expression and regulation of PGE₂ receptors in the hippocampus. *J Neurosci Res* 81: 817-826, 2005.

Chen C & Bazan NG. Endogenous PGE₂ regulates membrane excitability and synaptic transmission in rat hippocampal CA1 pyramidal neurons. *J Neurophysiol* 93: 929-941, 2005.

- Chen C.** ZD7288 inhibits postsynaptic glutamate receptor-mediated responses at hippocampal perforant path-granule cells synapses. *Eur J Neurosci* 19: 643-649, 2004.
- McDermott CM, LaHoste GL, **Chen C**, Musto A, Bazan NG & Magee JC. Sleep deprivation causes behavioral, synaptic and membrane excitability alterations in hippocampal neurons. *J Neurosci* 23: 9687-9695, 2003.
- Chen C**, Magee JC & Bazan NG, Cyclooxygenase-2 regulates prostaglandin E2 signaling in hippocampal long-term synaptic plasticity. *J Neurophysiol* 87:2851-2857, 2002.